

Problem 2 Let L be the language defined by the regular expression:

$$(ab^*d \cup c^*d)^*(dcc \cup a^*)d$$

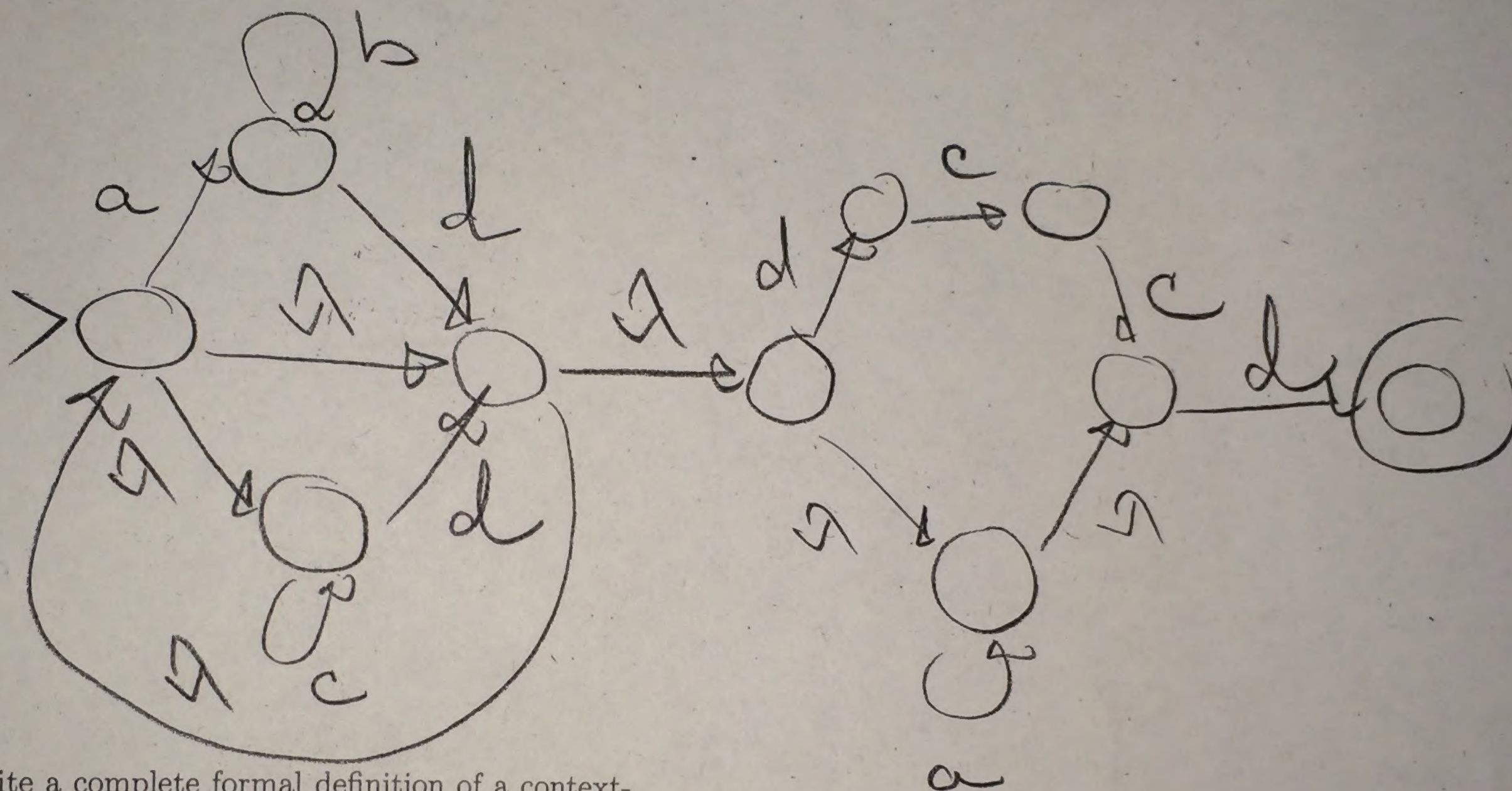
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Solution

(a) Draw a state-transition graph of a finite automaton that accepts the language L . If such an automaton does not exist, state it and explain why.

Answer:



(b) Write a complete formal definition of a context-free grammar that generates the language L . If such a grammar does not exist, state it and explain why.

Answer:

$$G = (V, \Sigma, P, S)$$

$$\Sigma = \{a, b, c, d\}$$

$$V = \{S, A, B, K, D, E\}$$

$$P: \begin{aligned} S &\rightarrow EDd \\ E &\rightarrow \epsilon / EE / aBd / Kd \\ B &\rightarrow bB / \epsilon \\ K &\rightarrow cK / \epsilon \\ D &\rightarrow dcc / A \\ A &\rightarrow aA / \epsilon \end{aligned}$$